AVIATION

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Underwood and Underwood

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NUMBER 20

SPECIAL FEATURES

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P A C K A R D

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AVIATION

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A Great Achievement

LIEUT COMMANDER BYRD'S flight to the North Pole is one of the great epics in the development of aviation Nature put up barriers of ice and snow around the Pole which made it almost impregnable to the assaults of man Countless expeditions with infinite toil and hardships have struggled toward the Pole only to be turned back baffled and beaten by the terrific cold and the roaring, snow-ladened wind. Mechanical advancement and the march of science seemed to be of no avail in wresting from nature the secrets of the North Peary finally reached the Pole through sheer determination of purpose and, through the use of brute strength applied to the most primitive equipment. Nothing can dim his achievement, but the conquest of the polar regions did not increase their accessibility to man It took Peary eight months of almost superhuman effort to reach the Pole and return. It took Byrd less than a day. The conquest is most complete and extraordinary. The barriers to Northern exploration have at last been broken down The airplane has again shown that it can do things which no other form of transportation is able to accomplish. It should not be gathered that the flight was either easy or that at the present time it can be repeated without an element of considerable risk, but it has shown that all parts of the North can be reached in a minimum of time by the route of the air Ultimately it may lead to the development of air routes between the American and Asiatic continents by way of the polar regions, but this is still far in the future

The flight which Byrd accomplished this year would not have been possible a few years ago The MacMillan expedition of last year and the Amundsen flight both contributed to the possibilities of success. The development of observation instruments which can be used from the air is a very recent science and one to which Byrd himself has made great contributions. From the aeronautical viewpoint the flight is a complete vindication of the value of the three-engined plane and of the ability of the air-cooled engine to function under most adverse conditions

Byrd's flight to the Pole, like the flight around the world, will keep the interest of the public focused on aviation and will increase its belief in the possibilities of aerial transportation

The newspapers are giving a large amount of space to the flight, and as our readers will already have had all the news before this issue reaches them, we will not try and duplicate the general story In a later issue, however, Commander Byrd's flying experiences and technical observations will be covered

AVIATION certainly extends its most sincere congratulations to Lieut Commander Byrd and Pilot Floyd Bennett for having successfully accomplished what so many have dreamed of doing

Cooperative Flying Clubs

THE IDEA back of the English "Light Plane Clubs" could well be followed in this country There are, undoubtedly, a large number of young men who want to fly but are unable to do so as the expense of owning their own plane is too great If they could have the use of a plane at reasonable rates they would do a considerable amount of flying The difficulties of joint ownership and use are considerable, but they have been solved in certain spheres, such as the athletic and recreational facilities offered by many clubs, and they could undoubtedly be solved in regard to the joint use of a plane

Actually, the idea of a cooperatively owned plane could now be put into effect in many towns Many of the members of Aero clubs or of numerous chapters of the N.A.A., are sufficiently wealthy and interested in aeronautics to subscribe the original price of the plane, if these individuals were not in a position to make use of the plane themselves If such a plan were developed, the club could afford to build its own hanger and keep a pilot and mechanic but in most cases it would probably be better to leave the maintenance of the plane to the local flying company This would save much work on the part of the members of the club and would also help out the particular aerial service company The arrangements and the rates charged would have to depend entirely on local conditions and could be worked out in many different ways, but, undoubtedly, flying could be greatly cheapened, especially if the non-flying members paid part of the expenses of the club.

Flying for sport depends a great deal on the atmosphere in which it is done. A group of congenial friends who club together and own a plane of their own can have a great deal more fun, and therefore, will fly considerably more than if they had to go out and rent a plane The method by which such a club would be started would differ with different localities In some cases it might be fostered by a small group of young men who wanted to fly while, in other cases, it would be initiated by the local air club But, in almost all cases there would probably be only one or two people who would be willing to put the thing over The professional pilot of the locality could spend his time profitably by working out the cost of the flying, arranging for the maintenance and storage of the planes, etc As the primary object of the club would be to give reasonable rates to its members the pilot should not expect an undue profit. If the club were well handled, he could expect a considerable increase in the amount of local interest taken in flying He would be giving instruction and, in the long run, would sell private planes to the members of the club and often make valuable financial contacts if he wished to expand his business.

Metal Construction of Airplanes

A Detailed Discussion of the Conversion of the Navy TS Plane into the Duralumin Built F4C-1 Plane. The Principles of and Reasons for the Cambered Spar.

By CHARLES WARD HALL

The metal construction of airplanes is a subject of an extremely specialized nature, the problems of which are of very first importance since this type of construction is becoming more and more general and is favored by both service and commercial aeronautical authorities. In this field of development, few have given closer attention to the problems involved than has Charles Ward Hall, of Charles Ward Hall, Inc, 156 East 42nd. Street, New York City, N Y. In addition to a number of original airplane designs, carried out in all-metal construction (with fabric covering), including the Hall all-metal sport plane, the company has developed a number of conversions to the special order of the Services Notable in this class, is the Navy F4C-1, a single seater fighter, which has been adapted, in the main by Charles Ward Hall, from the Navy TS plane The work was carried out late in 1924 The Curtiss Aeroplane and Motor Co. Inc., designed and furnished the following, in connection with the production of this plane The wheel type undercarriage, engine cowling, installation of fuel system, and machine guns; and also applied the fabric covering of the wings, fuselage, etc. It should be pointed out that, while the designation of the F4C-1 indicates it to be a single-seater fighter, its predecessor, the TS plane, was classified prior to the adoption of the Navy's now standard system of plane designation and, consequently, bears an obsolete classification The naval system of plane designation is set forth elsewhere in this issue of AVIATION.—EDITOR

The F4C-1 airplane is a biplane of 25 ft span, 18.33 ft overall length and 8.75 ft extreme height, with a gross weight of 1027 lb light and 1700 lb loaded The machine is a metal version of the standard Navy TS plane which was produced in wood It is designed to be adaptable either to a land type undercarriage or to the attachment of twin floats, as a seaplane The power plant, fuel capacity, armament and useful load items are identical in the TS and the F4C-1, except that the F4C-1 has a metal propeller weighing 27 lb more than that in the TS machine. Likewise the power plant and instruments, as a unit, weigh 17 lb more in the F4C-1 plane than in the TS design. The wing section is identical in each case. The brief dimensional details of the TS design are as follows: Span, 25 ft.; overall length, 21.4 ft.; height, 9 ft.; weight empty, 1216 lb., and weight loaded, 1905 lb. Because of the close similarity between the two designs and the equal useful loads, it will be interesting to discuss, at some length, the structural details of the metal plane

All Metal But Lighter

The F4C-1, except for the fabric covering of the wing and tail surface and of the fuselage, is constructed wholly of duralumin, whereas the TS, also fabric covered, is built entirely of wood, with the usual bracing In general, metal framed airplanes weigh as much as, and frequently more than, their counterpart in wood. In the case of the F4C-1 and TS designs, however, the gross weight of the complete metal airplane is much less than the wooden machine In fact, the weight of the bare structural frame of the F4C-1 is less than one half that of the TS

This very considerable saving of weight, therefore, cannot be attributed solely to the mere substitution of materials It is largely due to a thorough system of design, not merely involving the correct proportioning of the principal members for resisting the stress maxima to which they may individually be subjected, but extending to even comparatively minute details

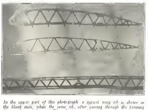
As a preliminary, a very complete stress analysis of the entire structural framework was made, including an investigation of the effects of redundancies and of the distortions due to the loadings, the familiar method of least work and also the less commonly applied law of reciprocal deflections (usually attributed to Maxwell) were used wherever appropriate Secondary stresses were treated carefully, (a), in such a manner as to balance one against another wherever practicable, thus reducing the effect of both, (b), by introducing secondary stress to relieve the free edges of open hollow sections, or to control the plane of flexure of unsymmetrical sections, (c), by maintaining very gradual changes in length, width, or moment of inertia, in the members of any truss, (d), by proportioning the various trusses to enable single intersections and to form approximately equilateral triangles, so far as practicable, short panels were arranged at members most stressed in compression, (e), by the use of forms allowing high unit stress while also using a large ratio of length to width, (f), by arrangement of each web member so as to form an integral part of the entire truss, and (g), by eliminating secondary stresses where such could not be utilized to advantage, in some cases, by the use of fully concentric joints, while, in other cases, by controlling the curvature of the gravity axis of members subject to combined side load and end load so as to eliminate the effects of column action, etc The effective strength of members has been enhanced through restraint or by the fixing of their ends This has been done in nearly all cases where the deflection of the entire truss under load would then result in double curvature of the member In cases where single curvature would result, end fixing has been avoided

A general view of the F4C-1 Navy Fighter (Wright Whirlwind) The apparent sagging of the rear spar of the upper wing is due to the cambered feature of the spars which is fully discussed in this article

The upper wing panel seen from the underside before covering

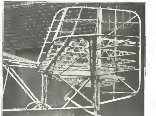
Wing Ribs Formed of Single Sheet

Simplicity of construction has received considerable attention As an example of this, the wing ribs and tail surface ribs are integrally formed from a single sheet. Likewise, fuselage joints, in general, consist each of a single forging, tightly fitting the longeron and provided with integral lugs rigidly secured to the web struts and stays Wherever practicable, round tubing has been used for structural members. In those other cases where bulk controls the form of section, the most efficient available form has been used For resisting torsion or compression, a single tube of appropriate thickness and diameter is, if unperforated, 100% efficient Where there is considerable bending stress combined with compression, as in wing spars, the single tube is invariably heavier, and less efficient than is a trussed form of construction. In such a spar truss, if the chords are formed of a plurality of tubes and the web members are also of tubular form, and a proper ratio of spar depth to spar width in relation to the length of the lift bays and the drag bays, is maintained, the utmost possible efficiency attainable by mere form of cross section will result.



In the upper part of this photograph a typical wing rib is shown in the blank state, while the same rib, after passing through the forming dies, is shown below The rib is formed entirely of one sheet In the lower part of this photograph, a section is shown of a spar which has undergone an extreme test of combined end and side load

However, some 40%, or more, may be added to the ultimate efficiency of even so nearly perfect a spar, by cambering it in a curved form between its supports, instead of building it straight, and by reducing the cross sectional area of the chords at their less stressed parts. Such a camber is sinusoidal in form, the crests of the curve coinciding with the interplane struts, as supports, with the trough coming nearly midway between supports. Reduction of the area of the chords, where these are less stressed under the combined side and end load, involves, for an upper spar, the reducing of the lower chord area near the supports and of the upper chord area near mid span For a lower spar, under such combined load, the upper chord is reduced at the supports and the lower chord near mid span Evidently, such a variation in area between the upper and lower chords results in a shifting of the gravity axis of the spar section to a position away from its position of symmetry and nearer to the larger chord. In other words, the actual gravity axis of the spar has been cambered along the spar length in the same manner as if the actual structure of the spar itself had been curved



A general view of the tail surface assembly

The Cambered Spar in Practice

When an upper spar in an airplane wing has been so constructed and the plane is in the condition of pulling out of a dive, the lift load tends to straighten the spar between its interplane supports and, if the spar has been correctly proportioned it will be quite straight when the intended maxi-

mum load factor has been reached and, thus, the column bending moment due to the product of end load and the eccentricity in a normally constructed wing which would be flexed under the load, will be eliminated

In cambered spars of this type, the ultimate load sustained, as shown by tests, is not at the yield point, as would seem to be indicated by the permanent set after the removal of a load movement On the contrary, these spars will sustain, before failure, 40% to 50% more load than was required to produce the first well marked set

Preventing Column Action Failure

Another method of preventing failure by column action through the shifting of the gravity axis, consists in gradually varying the width of the member, as is done with the web members of the rib trusses These are of parabolic cross section with approximately 55 deg angles The apex is maintained straight and the web is upset at its intersection with the chord, sufficiently to center its gravity axis on the chord flange. This arrangement results in a gradually curved gravity axis of the web member, tending, as load is applied, to increase the compression at the apex of the section and to relieve the edges in order that they do not buckle

Another type of reinforcement against buckling is used for the rib chords the outer flanges of which are occasionally

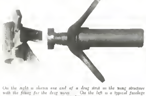
A typical fuselage joint employing the fitting shown in another photograph on this page

braced to a panel joint Such bracing adds about 60% to the ultimate strength of the entire rib The ribs, as a whole, are of Z section and unsymmetrical Instead of setting them in a plane perpendicular to the wing panel plane, they are set at an angle of 88 deg thereto, thereby checking failure

Eliminating Secondary Stress

Wherever, in a trussed or latticed column, the diagonal web system terminates at a rectangular gusset plate, the secondary stress in the chords adjoining the gusset is very large, not infrequently 100% of the primary stress This is due to the widening of the column under load, which accompanies its shortening The diagonal web system has no tendency to restrain this widening but a rectangular gusset effectively prevents it and so produces a large bending moment in the half panel adjoining The panel joint plates of these trusses are of Y form, obviating any half panels, and permitting the attachment of lift and drag bracing to the spars without interruption of the continuity of the diagonal web system This elimination of the large secondary stress, otherwise present, allows the use of lighter members for the spar chords Incidentally, the weight of the joint plates is also much less

The drag bracing throughout the wings of the F4C-1 consists of tubular struts provided with spherically cupped end fittings, which engage the upper surface of a double ball head bolt The drag wires are attached to a forked and spherically cupped strap, its interior fitting accurately the lower ball surface of the bolt which is passed though drilled holes in the strap and spar joint plates and secured by a nut Several important elements of strength and of weight saving result from this simple fitting The deep cupping of the strap and the widely separated points on the rim of the cup from which the strap forks lead, cause the line of action of the drag wires to intersect the axes of the bolts at their bearing



On the right is shown one end of a drag strut in the wing structure with the fitting for the drag wires On the left is a typical fuselage joint fitting

on the spar Tests have shown this arrangement to fail at ultimate load by the shearing of the bolt without perceptible bending, indicating the elimination of a bending moment which is frequently found in spars at the drag wire connections. As a result the spar joint plates are free from torsion and they, as well as the spar chords, may be lighter

Creating a Friction Fixing Moment

The bearing of the drag strut fitting upon the upper surface of the bolt results as load is applied, in pressing them into perfect contact, and, from the resulting friction, a fixing moment exists This fixing moment increases in direct proportion to the end load and is, in fact, numerically equal to the product of the coefficient of static friction, the radius of curvature, and the end load The fixing moment for any end load can thus be computed definitely On tests of the drag struts used in the F4C-1 wings, this frictional fixing moment was sufficient to realize a K factor in the Euler formula of 3 to 3.25, the tubing being only commercially straight and not especially rolled This is a higher factor than can usually be obtained by testing with carefully made flat ends Under loading, such long struts (l/r ratio=118) remain practically straight, up to the failing load, and, when the friction is overcome, they jump suddenly to a curved form, and continue to sustain a Euler factor of 1 while so bent

A horizontal tail surface after having sustained a sand load of 157 lb per sq ft The uniformity of strength over the entire structure is characteristic

When this load is removed the strut becomes straight and may be reloaded repeatedly with the same result. The struts so tested or "proof loaded" are now used in flight.

Another successful method of securing end fixity in a number of struts meeting at one point is the fitting used for the fuselage The stays and struts which form the web system of a Warren truss are constructed of tubing, a liner of tubing, about three diameters long, being first pressed into each end The tube ends and liners are flattened in a special

forming tool which sizes them to a press fit upon the flat lugs of the fitting The struts are fastened to the lugs by means of two staggered rivets, thus providing a structure which, under test, developed an end fixity factor in the Euler formula of about 2 for the longerons and 2.15 to 2.89 for the struts The end fixity of such a longeron is mainly determined by the tightness of the fit in the cylindrical part of the fitting and, secondly, by the length and stiffness of the four stays or struts meeting at any joint As at least one, and fre-

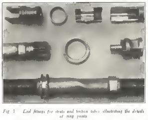


Fig 1 End fittings for struts and torsion tubes illustrating the details of ring joints

quently two, of these stays must be under tension, an additional stiffness is afforded to the combination. The end fixity of such struts depends chiefly upon the thickness of the fitting lug, and is, therefore, very readily computable in usual cases

Saving Weight in Connections

Further elements of weight saving can be obtained through particular attention being given to the methods adopted for connecting the principal members together while, at the same time, realizing their full strength as shown in the photograph, Fig 1 The upper center portion of this photograph shows a section through the joint of two tubes, made by inserting into the smaller tube a ring with an annular depression similar to that shown in the upper left corner of the photograph, and then by telescoping it into a larger tube, outside of which is a narrow ring, such as is shown The outer ring is then compressed, with the two tubes, into the depression of the inner fitting In the photograph, the finished fitting is shown in the middle row on the left, while a section of this fitting will be seen in the top row on the right, the fitting and ring before compression having about the proportions of those shown in the upper row on the left Such connections, properly proportioned, develop the full strength of the tube in compression, in tension or in bending, and, when failure occurs, it is definitely remote from the joint By forming the inner fitting to a polygonal cross-section as shown in middle row, right, of the photograph, and by compressing a tube and an external ring around it to the same polygonal form, a joint is produced which is, as shown at the bottom of the photograph, 100% efficient in torsion

Feasibility of Ring Joints

Joints of this type are not limited in production to very ductile material, as might be supposed, but are readily produced in material having a specified tensile elongation of 4% in 2 in merely through appropriate relations between the thickness of the tube, the curvature of the fillets and the depth of the annular depression, and between the diameter of the tube and the length of the ring The tube, inner fitting, and ring, of the sections shown, were loosened and turned upon each other before the sections were photographed in order that the joints might show clearly the details of construction Actually, such a section shows no joint unless magnified to 20 or more diameters

This method of construction has been very thoroughly tested The whole system of design is the result of extensive research into the most efficient and the lightest methods of supporting loads, commensurate with adequate strength Several thousand systematic and correlated tests were carried out in the development of the various methods of construction employed As a result, the F4C-1, as an example of the practical application of the various methods, has proved of adequate and complete strength under all conditions

The F4C-1, and other airplanes produced by Charles Ward Hall, Inc., is constructed entirely of duralumin, with the exception, of course, of the fabric covering and any bracing wires As duralumin cannot be welded, brazed or soldered without destroying its essential properties, the fastening of

The complete duralumin framework assembly of the F4C-1

one member or part to another must be accomplished by one of the methods described above or else by riveting. Drilling for and driving thousands of rivets is tedious and expensive work, particularly in places where jig location is impracticable. In the F4C-1, and other designs, the number of rivets has been reduced to the minimum. For instance, the ribs are each blanked and pressed from a single sheet, complete, riveting of their flange tabs is a jig job, while twelve rivets secure each rib to the spars.

The spars are drilled in a jig and assembled in another jig which holds all parts in place while pins or rivets are passed through the pre-drilled holes. These average seven per linear foot of spar. Further rivets are required for securing the trailing edge to the ribs and for the lacings staying the ribs. On the average, this means three rivets per square foot of wing area. The sheet metal nose stiffener, a necessity for a wing section of as steep a curvature as U.S.A. 27, requires more than half the entire number of rivets in the wing structure. It could be omitted with some other forms of wing section.

In the fuselage, the rivets per panel joint average eleven in number, of which eight are jig drilled. The tail surfaces average twenty rivets per square foot of area. The total number of such fastenings is obviously far fewer than of nails or the like, in wooden construction.

For quantity production, in lots of several hundred planes, spars, blanked and pressed from single sheets, would cost less than the built up spars. They would weigh more, however, although not as much as spars formed of a single tube, wherein, to obtain the necessary depth for a rigid structure together with a reasonable thickness—diameter ratio, the material, which serves as web, is greatly in excess of requirements. Consequently, in such a case, the weight is apt to be excessive.

The spar joint plates are blanked from heavy sheet, very economically, in any quantity. The collars, hinges, clips, drag strut ends, etc., are also produced by blanking and pressing.

Weight of Structure

A resume of the general weight details of the F4C-1 and the TS plane follows:

WING GROUP

Upper panels (including [illegible])	F4C-1	TS		
Ribs complete	1 111 lb	11 00 lb		
Spars	14 474 lb	49 00 lb		
Bracings, fittings and bolts	1 181 lb	26 05 lb		
[illegible]	1 500 lb	5 28 lb		
			[illegible] 9142 lb	112 03 lb
Lower panels (or [illegible])				
Ribs [illegible]	1 11 lb	8 10 lb		
Spars	1 187 lb	[illegible]		
Fittings, edges, covering	7 96 lb	19 lb		
			1[illegible] 809 lb	15 56 lb
AILERONS			10 1920 lb	13 066 lb
INTERPLANE STRUTS AND WIRES			32 5787 lb	72 28 lb
Total wing group			117 7478 lb 47 87%	215 926 lb 100 %

TAIL GROUP

Stabilizers and elevator	[illegible] lb	[illegible]		
Fin and rudder	1784 lb	8 53 lb		
			10 1456 lb 50 5%	31 57 lb 100 %

BODY GROUP

Longerons	[illegible] lb	21 1 lb		
Stays and wires	9 569 lb	31 lb		
Fittings, bolts, nuts, etc.	6 18 lb	1 0 lb		
Engine supports and cradle [illegible]	5 01 6 lb	21 5 lb		
Stern post	4817 lb	1 0 lb		
			38 7187 lb 48 8%	80 118 lb 100 %
Total framework			164 3423 lb 46 2%	158 256 lb 100 %

The general performance details of the F4C-1 are given herewith:

Maximum speed	126 m p h
Stalling speed	48 8 m p h
Climb 10 minutes	11,600 ft
Climb to 5,000 ft	4 1 min
Climb to 10 000 ft	8 2 min
Climb to 15 000 ft	16 5 min
Service ceiling	18 400 ft
Endurance full speed—2 75 hr	314 miles
Endurance cruising speed—6 1 hr	525 miles

The items of cost in order of importance for but a few airplanes, not on mass production lines, are:

(a) engineering and design, (b) tools, dies, jigs and fixtures, (c) production of parts, (d) material, and (e) assembly.

For an order involving a large number of planes, the first two items become merged, and the third and fifth items are much reduced. Many parts, such as fuselage joint fittings and strut end fittings, milled or turned from bar, in small quantity, are capable of being hot pressed or forged to within a light finishing cut, comparable to broaching, when the quantity warrants.

Lieut. Comdr. Byrd Flies to North Pole

As this issue went to press news came in that Lieutenant Commander Richard E. Byrd and Pilot Floyd Bennett had successfully flown from Spitzbergen to the North Pole and return. According to dispatches to the *New York Times* the plane left Spitzbergen on May 9 at ten minutes to one in the morning and returned to its base at 4 20 in the afternoon of the same day, having covered the 1,500 odd miles to the Pole and return in a little over 15 hrs. Reports indicate that the weather was clear but exceedingly cold. Navigation was practically entirely by sun compass, as the sun shown continuously and the magnetic compasses would not function properly so close to the Pole. The oil system on one of the engines sprung a leak shortly before reaching the Pole, but the engine kept running until the plane returned to land. Commander Byrd's nose and a couple of fingers were frostbitten while he took observations in the zero weather. The plane used was a Fokker monoplane equipped with skis and powered with three Wright Whirlwind engines.

A general account of the various attempts to reach the Pole was given in our issue of April 19. In later issues a more adequate account will be given of Byrd's extraordinary flight.

Stettin, Germany to Be Large Airport

Commercial aviation is making rapid strides in Germany as a means of transport and quite a number of excellent new airdromes are now in use, such as those at Tempelhof, near Berlin, Devrau near Konigsberg and Fuhlsbuettel near Hamburg. Having completed these land stations, the Germans are now about to establish a number of up-to-date maritime airdromes. It is generally anticipated that, with the developments of the coming year, maritime aviation will become an important factor in passenger traffic.

The first city in Germany to resolve to build a really up-to-date maritime airdrome on a grand scale is Stettin. This city will, henceforth, serve as the starting-place for seaplanes traveling to Stockholm, Helsingfors, and Leningrad. In order to connect up this maritime service with the land planes coming from Berlin, a big land airdrome is to be constructed at Stettin simultaneously with the maritime airdrome.

For the purpose of the combined sea and land service the Airdrome Administration at Stettin has chosen a site on the Dammscher See, midway between Stettin and Altdamm. The projected airdrome measures about 2 km each way, and the level of the whole of this area is at present being raised by two meters by the addition of artificial soil. By the Summer it is also hoped that operations will be far enough advanced to begin building the hangars for seaplanes flying from Stettin to Swinemuende, Berlin and Stralsund.

Other extensive buildings are also to be erected, including a wireless station, a meteorological observatory and buildings for the customs and for the police. In order to make the Dammscher See suitable for the draft of seaplanes, the southern end of this lake is being dredged and other regulative measures are being adopted. The whole scheme will, it is estimated, cost about 7,000,000 marks.

Military Aviation Bill Passes House

THE PLAN of the War Department for a five-year aviation building expansion, costing $150,000,000, was approved by the House on May 5 by a unanimous vote, after two hours of debate. Recently the House passed a bill for naval air development at a cost of $85,000,000, over the same length of time.

The Army Air Service measure passed on May 5 is merely an authorization, and, before the money is appropriated, the expenditure must be scrutinized by the War Department, Budget Bureau and House Appropriation Committee.

As Acting Chairman of the Military Affairs Committee, Representative James of Michigan said the bill did not go so far as many members thought it should in reorganizing the Army Air Service, but was a decided step forward. It is the first comprehensive bill agreed upon since the aircraft problems were seriously tackled in 1919.

The program calls for 2,200 first-class fighting planes at the end of five years, 1,650 regular flying officers, 550 reserve officers on active duty and 15,000 enlisted men, including 500 flying cadets. To meet criticism of the present administration of the Air Service, the bill provides for a general tightening of the membership of the Service, so that eventually its personnel will be 100 per cent fliers. It also provides that the command of the Service must be by flying officers and that the Service shall have increased representation on the General Staff.

The only objection came from Representatives LaGuardia of New York and Schafer of Wisconsin, who thought three Brigadier Generals should be flying officers, instead of permitting one to be a non flier. This change was defeated, and a motion to recommit the bill, just before the House adjourned, was rejected by a vote of 74 to 30.

Competitive Designing

One of the most important aspects of any legislation concerning government procurement of aircraft is the question of competitive bidding. While there is a clause concerning this in the Navy bill, there is, apparently, no mention of it in the Army bill. However concerning this general subject, Representative Vinson of Georgia has introduced a bill which if passed, is destined to put completely at rest all further argument on this particular aspect.

The Joint Military and Naval Committee of the House of Representatives, is considering legislation introduced by Representative Vinson of Milledgeville, Ga., by the protection and encouragement of aircraft designers through what is termed competitive designing. A number of drafts of bills covering the subject have been submitted by the Judge Advocate General of the Navy and by the Army General Staff. All of these have been discarded for the time being.

A new draft of a bill was presented, May 6, by Representative McSwain, at the request of the committee. The McSwain draft provides that aircraft designing competitions shall be advertised in at least three publications of nationwide circulation, and that the requirements under the competition will be forwarded to all who answer these advertisements.

The bill also provides that the designers shall have six months to present designs, after which the War or Navy Departments will have 30 days to decide upon which is most desirable. Price will be named in submitting the design, but the deciding factor will be desirability.

The Question of Manufacture

After the design is selected, manufacture of planes from it would be limited to the designer, providing that he has the equipment and other facilities for the manufacture of planes in the quantities desired by the government. In the event that he has not facilities to produce the planes, discretion is given the department to buy the design at the price quoted when it was submitted or to negotiate for a lower price.

Once the design becomes the property of the department, it is provided that competition for the actual building of the planes shall be open to the entire aircraft industry.

Protection is provided for inventors who now claim the Government is using their devices without just compensation under the proposed bill. Such claims, dating back to 1920, would be permitted to become the subject of litigation in any United States district court, and the Government would waive its right of exemption as a sovereign.

The bill was discussed briefly, May 6. Copies of it were submitted to both the War and Navy Departments for comment.

A number of minor changes already have been formulated by the committee members, and these will be considered by the special committee.

General Brancker, President, Royal Aeronautical Society

The Royal Aeronautical Society, England, announces that, at a Council meeting held on April 13, 1926, Air Vice-Marshal Sir Sefton Brancker, K.C.B., A.F.C., F.R.Ae.S., was elected President of the Society. General Brancker, it will be remembered, is Director of Civil Aviation in the British Air Ministry. He is very well known in the United States, his most recent visit terminating only a few weeks ago.

Canadian Border Flying Regulations

International flying between the United States and Canada will continue to be subject to the regulations agreed upon in 1922 for another year, according to the Department of State. By an exchange of notes between the British Embassy and the Department of State, the old regulations are to remain in effect until April 30, 1927.

Under these arrangements, when a pilot of American or Canadian nationality wishes to cross the international line he must send notification in advance. Canadians must address the Secretary of State and Americans, the Secretary of the Air Board, Ottawa. They must give: 1 the date of the proposed flight; 2 the owner's name and address, 3 the pilot's name and qualifications, 4 the type of machine to be used, 5 the route and duration of the proposed flight, 6 the purpose for which it is being undertaken.

The old 1922 agreement has been modified only slightly in the annual extensions, the recent exchanges of notes specifying that the United States Army or Navy Air Services shall certify as to the airworthiness of American machines desiring to fly to Canada, this certificate of airworthiness being added as a requirement before crossing the border into Canada.

The crews of airships entering the United States from foreign countries are not required to have passports, if they fulfill the requirements applying to crews of steamships.

Alien passengers are required to have the same documents as aliens arriving by sea or rail. The advance advice to the Secretary of State of the plans for an international flight and the place of expected arrival is passed on to the Secretaries of the Treasury and Labor, for their information and regulation of customs and immigration inspection.

Russia Buys Aircraft Engines

The largest foreign order placed in the United States in February for aircraft engines, was by Soviet Russia, the Department of Commerce has announced. Of the total of $57,124 worth of airplane engine exports for the month, Russia's order amounted to $48,068. Russia also ordered $14,158 worth of parts for aircraft and aircraft engines.

The Madrid to Manila Flight

Second Long-Distance Spanish Flight Not Successful as Previous South Atlantic Undertaking.

PRESUMABLY ENCOURAGED by the almost unqualified success of the recent Spanish flight of Comdr. Ramon Franco from Spain to the Argentina, another long distance flight was immediately conceived and, on April 5, three Breguet XIX machines, flying under the Spanish flag, set out from Madrid for Manila, Philippine Islands. The pilots of the planes were Capt Rafael Martinez-Estevez, commander, Capt Joaquin Loriga-Taboada, and Capt Eduardo Gonzales-Gallarza, while the mechanics were Pedro Mariano Calton, Joaquin Arozamena and Eugenio Perez.

The route of the flight was laid out as follows Madrid, Algiers, Tripoli, Cairo, Egypt, Damascus, Syria, Bagdad, Irak, Basra, Irak, Bushire, Persia, Bender Abbas, Persia, Karachi, India, Calcutta, India, Bangkok, Siam, Saigon, Hue and Haiphong, French Indo-China, Macao and Manila. The planes, incidentally, which of French design, were constructed in Spain, and the squadron was given the name of El Cano after Juan Sebastian Del Cano, who brought one of Magellan's ships back to Europe and thus may be claimed as the first circumnavigator of the globe. The machines are equipped with single Lorraine-Dietrich engines of 450 hp and each plane carries 225 gal of gasoline and 25 gal of lubricating oil

The Start

The squadron left on its flight of approximately 10,000 miles at 8 15 a m on April 5, from Cuatro Vientos airdrome near Madrid The first stop was planned to be at Algiers, French North Africa, a distance of about 500 miles The planes passed over Cartagena at 10 50 a m and then headed toward the sea in the direction of the African coast.

They reached Algiers successfully and without untoward incident On the next day (April 6) the three machines set out for Tripoli and Captain Estevez, commander of the flight, landed at Tunis, North Africa, having lost sight of the other two planes in a fog The other two machines proceeded straight to Tripoli and landed there in the afternoon Captain Estevez's plane sustained a burst tire on the right wheel in landing but, having repaired this, the flight was continued the next day to Tripoli in order to catch up with the other two planes The flight was undertaken in bad weather, the rain and mist being very thick In accordance with a previously arranged plan, the other two planes did not await him at Tripoli and proceeded to Bengazi, Cyrenaica, on April 7 continuing, the next day to Cairo, where they landed at the Royal Air Force airdrome at Heliopolis In the mean time, Captain Estevez had reached Bengazi, being, thus, still one leg behind his companions However, at Cairo, Captains Loriga and Gallarza awaited his arrival on April 9, and work was commenced on overhauling the three planes

Serious trouble did not overtake the fliers until the flight from Cairo to Bagdad, Iraq, was undertaken, on April 11 The three machines left Heliopolis airdrome at 7 00 a m On the flight, the planes got separated and Captains Loriga and Gallarza reached Bagdad at 4 p m and 7 p m respectively, while Captain Estevez's machine did not arrive and was not heard of The distance between Cairo and Bagdad is about 800 miles, across the Syrian Desert One of the other planes was forced to land in the desert to repair a fuel tank, according to dispatches, but resumed the flight

The British immediately sent out R A F planes to search the desert for Estevez who was last seen sixty miles from Amman after having passed Jerusalem, The route between Cairo and Bagdad which is frequently flown over by the British service pilots, is well marked, there being a large pipe line stretched across the surface of the desert for the guidance of pilots It is said that Estevez passed station "E" on the route and then differed with his companions as to the correct route going off in a southerly direction His companions, believing him mistaken, did not follow and no trace of the leader was discovered until the searchers found his machine on April 13, 140 miles from Amman The plane appeared to be in perfect condition and a note was attached to it, indicating that the pilot and mechanic had decided to make their way on foot to Amman The landing was apparently made toward the evening of April 11 Presumably the men stayed throughout the night by their machine departing after dawn the next day on the long walk to Amman, not aware that the city was 140 miles distant

Flight Proceeds

In the meantime, the other two pilots, proceeded to Bushire, Persia and, on this flight, one of the planes was forced down April 13, near Samawah, on the Euphrates River, about 150 miles from Bagdad The other machine proceeded and both arrived eventually at Bushire The pilots apparently regard their flight as individual rather than a team event. However, continuing the flight together, they left Bushire the same day as their arrival and reached Bender Abbas, Persia in the evening On April 14, the two planes continued to Karachi, which was reached later that day, the distance between Bender Abbas and Karachi being about 725 miles

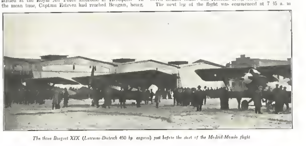
The next leg of the flight was commenced at 7 35 a m on April 16, for Agra, India, and the 800 miles was covered in 7 hr 10 min, Agra being reached at 2 45 p m In the meantime the search for Captain Estevez and his mechanic Calvo was continuing and on April 17 the report was issued that Captain Estevez was found by Flying Officer Coghill, of the British Royal Air Force, forty miles from his abandoned machine His feet were blistered, but otherwise his condition was said to be fair He was taken by airplane to the nearest medical station Mechanic Calvo was found twenty five miles further away from the plane Thus neither of the fliers abided by the inflexible rule relating to flying across the desert, never to leave the machine in the event of a forced landing The men were immediately taken to hospital in Amman, although the condition of Calvo, who had gone on ahead of his companion, Estevez, in the hope of bringing relief from Amman, was such that he could not be moved immediately, his condition being so bad

It is understood that after leaving his comrades and ineffectually endeavoring for several hours to strike the Bagdad track, Captain Estevez was forced to land, owing to lack of fuel His machine was found five miles outside the track usually followed in traversing the desert.

Captains Loriga and Gallarza continued their flight and, on April 18, reached Calcutta from Agra, a distance of approximately 700 miles Loriga was troubled with burst tires at Agra and, therefore, left that point about two hours after his companion Apparently most of the flying over the tropical areas was carried out at about 6000 ft., it being found to be less bumpy there The heat was very excessive After a rest at Calcutta, the fliers reached Rangoon, Burma, on the afternoon of April 21, having left Calcutta in the early morning and passing through very bad weather

More ill-fortune overtook the flight on May 1 when, after Loriga and Gallarza left Hanoi, French, Indo-China, together, Loriga and his mechanic, Calton, were not heard of Gallarza arrived at Macao on Saturday afternoon, May 1, and damaged his machine in landing Fears are entertained that possibly Loriga has been forced down in the seas in the Gulf of Tonkin or the South China Sea Gallarza reported that much of the 550-mile flight, chiefly over water, was difficult because of misty weather, making visibility extremely poor

At the time of this going to press, there is some doubt as to the advisability of the flight being continued, even if Loriga is found The Japanese Government originally refused to permit the Spanish fliers to land on or even fly over the Island of Formosa, on the flight between Macao and Manila Later, however, it is reported that the Japanese decided to rescind these restrictions to the extent of permitting the planes to pass over the Island on condition that under no circumstances do they carry cameras and a landing shall be made only in cases of extreme emergency It is believed, however, that the flight, under such conditions, would be extremely hazardous, it being asserted that it would be absolutely necessary for the planes to land on the Island of Formosa to replenish fuel supplies. The distance from Macao to Manila, direct, is about 1000 miles No further step has, as yet been taken, nor has Captain Loriga been found at this time



The three Breguet XIX (Lorraine-Dietrich 450 hp engines) just before the start of the Madrid-Manila flight

A Danish Long-Distance Flight

A flight by Danish military aviators from Copenhagen to Japan is being planned for the Spring Two Dutch-built Fokkers, with Lorraine Dietrich 400 hp engines will be used, and the route will probably be across Europe and via India and China

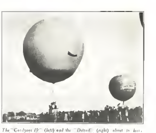
S.A.E. Aeronautical Meeting in August

Plans are being made for a two-day aeronautical engineering meeting to be held in Philadelphia by the Society of Automotive Engineers just before the National Air Races there The dates selected probably will be Aug 30 and 31, and the place, the Bellevue Stratford Hotel. Considerable attention will be given in the addresses and discussion to the subjects of design, construction and operation of both heavier and lighter-than-air craft

As the meeting will be held at a time when the Sesqui-Centennial celebration is in full swing, there will be a triple attraction for the large attendance which is expected

The National Balloon Race

The official report of the National Balloon Race which was held at Little Rock, Ark, is now available While Ward T Van Orman, flying the "Goodyear IV" won the race, the second and third places were secured by Capt Hawthorne C Gray, A S (Balloon S 23) and J A Boettner (Balloon Akron N A A) respectively Preliminary reports gave these latter two in the reverse order



The "Goodyear IV" (left) and the "Detroit" (right) about to leave Little Rock Airport on the start of the National Balloon Race

The air-line distances flown by balloons in the National Elimination Balloon Race, starting at Little Rock, Ark, as scaled from Geological Survey maps, are as follows

	Name of Pilot and Aide	Entrant	Name of Balloon	Landing Point	Distance in Miles
1	Ward T Van Orman (W W Morton)	Goodyear Tire & Rubber Co., Akron Ohio	GOODYEAR IV	8 mi South Sb. of Petersburg Va	848
2	Capt Hawthorne C Gray (D Johnston)	U S Army Air Service, Scott Field Illinois	S-23	7 mi. North of Mount Holly N C	835
3	J A Boettner (H W Maxson)	Akron Chapter N A A., Akron Ohio	AKRON N.A.A	15 mi North of Ishubell W Va and 7 mi Nb of Webb W Va	827
4	Lt James F Powell (Lt James F Early)	U S Army Air Service Phillips Field Md	S-21	12 mi due North of Hickory, N C	818
5	Herbert V Thaden (C. D Williams)	Detroit Flying Club Detroit Aviation Society	DETROIT	3 mi. W of Gulnare, Kentucky	574
6	Lt. Wm A Gray (Lt Rowland Ricketts)	U S Army Air Service, Langley Field, Va	S-20	Reedsville Ky in Carter County	570
7	Svend A U Rasmussen (Edward I Hill)	Detroit Aircraft Club Detroit Mich	DETROIT AIRCRAFT	3 mi W of Blaine Kentucky	568
8	Capt Lawrence F Stone (Capt. G R Oatman)	U S Army Air Service, McCook Field Dayton O	"S 19"	15 mi E of Willow, Ky and 7 mi. SE of Heidelberg Ky	510
9	Walter A. Ham (Robt. P Lehr)	Walter A Ham, Los Angeles Calif	GOODYEAR SOUTHERN CALIF	5 mi E of Broadhead, Kentucky	473
10	W C Naylor (K W Warren)	The Arkansas Gazette, Little Rock Ark	SKYLARK (PILOT BALLOON)	4 mi N of Crawford in Overton City Tenn	414

Army–Navy Standards

Standardization of Aircraft Parts, Undertaken Jointly by Army and Navy, Will Enable Closer Cooperation from Procurement Standpoint. A Great Advantage to the Aircraft Industry.

By MAJOR LESLIE MacDILL, A.S. and LIEUT. RALPH S. BARNABY, U.S.N.*

THE ARMY AIR SERVICE and the Bureau of Aeronautics, Navy Department are now issuing the first of a new series of standard part drawings. These drawings, known as AN standards, represent parts which have been standardized by the Army Air Service and the Bureau of Aeronautics. They represent the first results of the labors of a joint committee, consisting of representatives of the two Services, appointed by their respective chiefs for this purpose.

To the meetings held by this committee are invited representatives from the various airplane manufacturing companies, manufacturers of materials and parts for aircraft, and the Aeronautic Standards Committee of the Society of Automotive Engineers. In this way, the trade has been well represented, and it is largely due to their cooperation and assistance that the AN Standards have become possible.

War-Time Problems

The advantages of such standardization are manifold. During the war, when the Services were buying airplanes and parts in large quantities, it was necessary that standards be adopted rapidly. This was done by the Services independently. Naturally the results obtained were different. These differences have persisted, and, as a result, an Army turnbuckle, bolt, or the like, has been just a little different from a Navy part used for the same purpose,—different enough, however, so that a Navy Inspector could not accept the Army part, and vice versa. This required the part manufacturer to produce and carry in stock two kinds of materiel, and made it necessary for the airplane manufacturer doing work for both Services to purchase and maintain two separate stocks. From the service point of view, it represented increased cost and prevented exchange of material between the Services. It is the purpose of the AN Standards to eliminate these conditions.

The Society of Automotive Engineers, through its Aeronautic Standards Committee, is adopting these AN Standards as recommended practice for civil aviation.

Naturally, changes on such a large scale must be adopted gradually, and so effected as to entail a minimum of confusion and financial loss. It is believed that the Navy's method of accomplishing this is explained clearly in the following excerpts from a Bureau of Aeronautics letter accompanying the AN drawings, addressed to Inspectors of Naval Aircraft and to the Naval Aircraft Factory:

> "1. As a result of conferences between representatives of the Army Air Service and the Bureau of Aeronautics, an attempt is being made to standardize the specifications and drawings for aeronautical material and fittings. It is hoped that, in time, this will include all materials, the so called 'standard parts and fittings', and equipment common to the two Services.
>
> "2. The resulting specifications and drawings will be known as AN or Army Navy Aircraft Standards. In the case of the drawings, it is intended that they supersede the corresponding Naval Aircraft Factory drawings in the Standard Catalogue. The AN specifications will serve as master specifications for the preparation of new Navy Department Leaflet Specifications for the material or parts concerned.
>
> "3. To facilitate the use of the AN Standard Drawings a conversion list has been prepared, showing the corresponding AN number for every Naval Aircraft Factory part number for which an AN standard exists.
>
> "4. It is requested that the AN drawings be inserted in the front section of the Standard Catalogue, and that the corresponding Naval Aircraft Factory drawings, as shown on the list which accompanies the drawings, entitled 'Old Standard Drawings with Corresponding AN Standard Drawings, which Supersede Them', be removed and destroyed.
>
> "5. One of the precepts of the committee, in developing the AN Standards, was that their adoption should not work to cause loss or difficulty to the manufacturers, on account of stocks of old standard parts and materials. This applies to the manufacturer of the material or parts as well as to the aircraft manufacturer. With this in mind, it was endeavored to keep the new AN parts interchangeable with the old wherever possible. Accordingly, it was agreed that the promulgation of the AN Standards would not prevent the airplane manufacturers from using up the old material which they have in stock or may be required to purchase in the near future.
>
> "6. This last provision is necessary in order to work no undue hardship on the material or parts manufacturer. For his case, it was decided that he should be permitted to supply on orders calling for AN Standards, material or parts conforming to the old requirements until his supply is exhausted, unless, by special agreement between manufacturer and purchaser, it is desired to furnish the AN parts. It is intended, however, that the above apply only to parts manufactured before promulgation of the AN Standards, and that, in the future, such parts be made in conformity therewith.
>
> "7. Inspectors shall see to it that, after the date of promulgation, new stocks of parts are manufactured in accordance with the AN Standards for use on Navy contracts.
>
> "8. The date of promulgation for the standard drawings included in the present list is July 1, 1926."

New Air Service Standards Book

The Army Air Service has found it desirable, at this time, to issue an entirely new Standards Book which will include the AN Standards. This book is distributed to all Air Service Contractors and Inspectors. The preface to this book includes the following paragraphs, which outline the attitude of the Air Service regarding the use of old standard parts:

> "The issue of this new Standards Book does not automatically obsolete any stock on hand listed in the old book but not included in the new one. The old stock will be used for replacement in the Air Service equipment already in use and may be used in new articles, until the stock on hand at contractors' plants is exhausted.
>
> "Old stock covered by numbers in the New Standards Book is to be identified on new drawings by the new part number. Stock made up to the old standard part drawings is to be accepted on orders specifying the new numbers until the supply on hand at the part manufacturers plants at the time of issue of this book has become exhausted."

It may be easily realized that the field of AN standardization is almost without limit. The work started is an attempt to do away with the differences between the material specifications of the two Services. It was soon apparent that this was only a small part of the subject. The next most obvious field was in the so-called "standard parts" such as bolts, nuts, pins, washers, etc. These fields, and the field of power plant equipment and fittings, have only been partially covered. General equipment has been barely touched. With the promulgation of the first AN Standard drawings, however, the ground has been broken and the work should advance rapidly from now on.

*Major MacDill is Chief Engineer, Engineering Division, McCook Field, Dayton, Ohio, while Lieutenant Barnaby is of the Construction Corps, Bureau of Aeronautics, Washington, D. C.

The Pitcairn Fleetwing

A Five-Seater Passenger Plane With a Curtiss C-6 Engine.

THOUGH AT present only upon a comparatively small scale, yet operated upon a basis as sound and as thorough as are the largest and oldest aircraft manufacturers in the country, Pitcairn Aviation, Inc., of Bryn Athyn, Philadelphia, Pa., must be considered to have taken its place very definitely in the aircraft industry. A visit to the company's field in Philadelphia reveals the extensive activity which is being carried on. The hangar, a large one, is full to overflowing with machines of various types—a Waco here, a Fokker cabin plane there, and Orioles in various forms fill the hangar, while all corners and a partitioned-off quarter provide space for the storage of sets of wings and other airplane parts.

In the adjoining shops, welded steel tube fuselage construction is being carried on. The work is remarkably well done. Not only is the particular design of the fuselages extremely interesting, being characterized by the manner in which ample strength of the structure is obtained, while maintaining general simplicity throughout, but the actual welding operation is carried out with a skilled hand and the joints appear to be of the very first order.

An Interesting Spar Development

In the wood-working shop, wings and tail surfaces for a second model of the company's first design, the Pitcairn Fleetwing, are being constructed. The machine, originally intended as a passenger hop "ship", has proved an unqualified success. The fuselage of the machine is of welded steel tube construction, while the wings and tail surfaces are constructed of wood. A close inspection of the wing construction reveals the same class of workmanship as is characteristic of the metal fuselage work. The structure is generally carried out along conventional lines. The method of building the main spars is, however, of special interest. The spars are built up, to put it generally, of two more or less normal spars side by side and formed into one compound spar with plywood walls. The result is an exceedingly strong structure, possessing, at the same time, marked rigidity and lightness. Not only are the spars of the main wings of the Fleetwing constructed along this principle, but the smaller, tapered spar of the tail plane is built along the same lines. The rigidity of the complete structure of wing or tail plane is very marked. This was proved when an endeavor was made to warp the skeleton structure of a Fleetwing tailplane.

Apart from the routine manufacturing activities in the production of further Fleetwings, there is evidence of much original work being undertaken, not only in the way of original airplane design itself, but in the development of appurtenances of various classes and constructional methods. The small but busy looking drawing office possesses the atmosphere of very distinct activity under the able guidance of Agnew E. Larsen, chief engineer to Pitcairn Aviation.

The flying field of the company is a very fine one and another has been acquired on the Doylestown Pike, and is said to be the largest commercial field in the East. This field is to be used for the passenger carrying activities and two large hangars are already nearing completion, one of which will be let out to local operators. This field, without a doubt, will see large attendances this Summer, when the Sesquicentennial is in full swing, and it must be remembered that Pitcairn Aviation has been given the sole passenger carrying rights for the Exposition. This work is likely to keep James G. Ray, operations manager and chief pilot of the company, together with the company's other pilots very busy during the Summer.

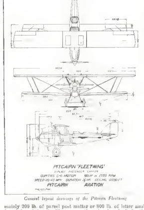
Harold F. Pitcairn, himself, does a very considerable amount of flying and handles the Fleetwing in such a manner as to fully exhibit its excellent qualities of quick take off and steep climb. A flight in the plane is an interesting experience. The two passengers double cockpits are very roomy and, at the same time, very well sheltered from the wind by the large wind shields. The plane itself is remarkably steady for its size, even on a somewhat bumpy day. A general description of the plane will now be given.

The Pitcairn Fleetwing

As originally conceived, the Pitcairn Fleetwing was to be used for the sole purpose of carrying passengers on short flights. While this purpose has been kept foremost in the minds of the designers, it was also deemed advisable to fit the plane to be used as a short-radius cross-country machine for carrying passengers, express or

The Pitcairn Fleetwing (Curtiss C-6, 160 hp. engine) five seater passenger plane

mail Where the latter purpose could be incorporated without sacrificing the primary object, it was done, and the Fleet wing is serviceable for short hops from the flying field for cross-country flights of 3½ hour duration with four passengers. By removing the two passenger seats a cargo space of 32 cu. ft. is made available, which will contain approximately 200 lb. of parcel post matter or 800 lb. of letter mail It is believed that the Fleetwing is the only plane built for the sole purpose of carrying out 15 or 20 min hops with passengers, and incorporated in the design are the features of a quick take-off, rapid climb, and slow landing speed, without making high speed the primary consideration as is frequently the case



General layout drawings of the Pitcairn Fleetwing

The fuselage proper, without cowling, is of trapezoidal section, the longer of the two parallel sides being at the top. This allows ample room across the shoulders of the passengers and for their feet and, at the same time, maintains cross-sectional area as low as possible The section of the fuselage top fairing is flat-sided, giving good vision and easier installation of windshields than would be the case in a curved fairing For ease of control on the ground a steerable tail skid is installed and is operated in conjunction with the rudder

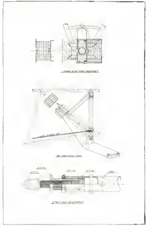
Wing Construction

The wing structure is of the single-bay biplane type with a pronounced stagger The upper and lower panels on any one side of the plane are made identical, with the exception of the strut and wire fittings, arrangements being made for reversal of these The wings are of wood construction with I section spars of spruce and lattice ribs of spruce and plywood Compression ribs and sidewalk ribs are of box section with spruce cap strips and plywood webs Two box ribs, with a plywood cover plate, are inserted at the interplane strut point The use of box ribs tends to make the panels tortionally very rigid.

The center section panel is of construction along similar lines to the outer panels and contains a 15 gal gasoline tank. This tank is on one side of the fore and aft center line and provision is made for the installation of another tank opposite

The wing struts are of circular section steel tubing with spruce fairing, but it is planned to use streamline duralumin tubing for these parts as soon as it can be procured from the manufacturers All of the interplane struts, with the exception of the middle strut of the N, which fixes the gap, can be adjusted without being removed from the plane, thus shortening, to an appreciable extent, the time required to complete the rigging Streamline wires are used throughout, the flying wires being double and the landing wires, single Two of the flying wires are crossed to take care of the drag and anti-drag forces in flight Rigging details of the wings are as follows the upper wing is set at an angle of incidence of 1½ deg. and the lower wing at ½ deg., giving an open décalage of 1 deg The tips are washed out to reduce any yawing tendency

The ailerons, which are unbalanced and identical on each side of the plane, are hinged directly to the rear spar. The aileron beam is of box section with spruce webs and plywood cover plates, the hinge eyebolts passing through both beams with a spacer spool between the webs. Aileron control cables are enclosed and run through the wings in aluminum tubing to facilitate replacement Ball bearing pulleys are used in the control system



Constructional details of the Pitcairn Fleetwing The top and middle drawings show the methods of attachment and detachment of the shock-absorber spools of the undercarriage and tail skid respectively The lower drawing shows details of the strut end adjustment

As mentioned above, the fuselage is of trapezoidal section and is welded up of 1025 steel tubing The Pratt type of trussing is used for the upper and lower longerons, and the Warren type to connect the two. Brace cables are used only in the engine mount, being replaced in the fuselage proper by V-bracing of good size tubes or by cross bracing of ¼ in tubes The engine mount is a separate structure, fastened to the fuselage with taper pins and nuts. Engine bearers of spruce and ash are used to insulate the fuselage from engine vibration In the first plane the fuselage is split just aft of the rear passengers' cockpit and the halves fastened together with taper pins having a castle nut on the small end, but this detail is to be eliminated on future reproductions of this plane The fuselage tapers at the rear to a very narrow vertical V, to the top of which the rear beam of the fin is bolted, and to the lower end of which, a short stud skid is fastened to protect the rudder in case of breakage of the tail skid Early taxiing and flight tests showed the wisdom of adding this feature

The landing gear is of the V type with through-axle and is of orthodox construction The Vs are made of circular section steel tubing faired with spruce, but streamline tubing is to be substituted when available The points most worthy of notice are the cast bronze blocks used to bolt the Vs to the fuselage and the shock absorber unit The latter is similar to the well-known DH-4 absorber but is removable The rubber cord is wound on two spools which are held the proper distance apart to be easily slipped on two saddles, one of which is welded to the V and the other, bolted to the axle There are four of these units, one forward and one aft of the axle of each wheel Several of these shock absorber assemblies are kept in the stock room ready for immediate replacement The wheels are 30 x 5, and, therefore, amply strong for all conditions The tail skid is laminated of spruce and ash, and is hung on a swivel mount, somewhat as in the case of the Jennie As in the landing gear, the shock absorber of the tail skid is wound on two cast aluminum spools which are readily removable by taking out a single bolt which also takes the check wires. The tail skid is removable upon withdrawing the pivot bolt, and the entire tail skid mount can be taken out by removing two additional bolts The shoe is cast in two pieces of manganese bronze which are bolted together on the skid

Tail Plane and Rudder Details

The tail surfaces are of fairly conventional construction The section used is double cambered and was developed at the M.I.T The tail surface beams are built up of spruce webs and plywood cover plates, similar to the ailerons. The hinge bolts pass through both webs and a spacer spool between the webs, tying the beam together and making it very strong tortionally The rudder is controlled by cables attached direct to the rudder bar, while the elevators, the halves of which are interchangeable, and are connected by a steel socket, are operated by a short push-and-pull tube from a lever on the fuselage to a horn on the under surface of the elevators The lever is operated by cables from the stick in the pilot's cockpit The fin is offset to balance the effect of engine torque and the stabilizer is adjustable at the front beam, on the ground before flight.

The power plant is a Curtiss C-6 engine delivering 160 hp at 1750 r.p.m. Gasoline is fed to the engine from the 15 gal gravity tank in the center section, which is filled from a 30 gal main tank located under the rear passengers' seat The gasoline is pumped to the upper tank by hand in from 2 to 4 minutes The tunnel type radiator with a honeycomb, sloping core, is supported beneath the engine mount and the expansion tank is located immediately behind the engine above the upper longerons The Curtiss-Reed duralumin propeller is turned over by a Bijur starter, for which a starting battery is installed on the plane The engine controls, gasoline piping, instrument leads, etc, are carried forward from the pilot's cockpit outside the fuselage struts and inside the fabric covering, where they are less liable to damage from the passengers' movements in and out of the plane.

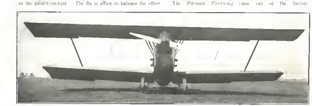
Accommodation

There are two passenger cockpits, each seating two persons side by side, and a pilot's cockpit behind The edges of all cockpit openings and the side of the passenger cockpits are upholstered Wooden floors are installed in the forward cockpits, while the pilot's cockpit is floored with triplex glass, two heel plates being placed convenient to the pilot's feet. Seat and back cushions are fitted to the passengers' seats and a seat cushion for the pilot's use A baggage compartment occupies the space forward of the front seat above the upper longerons under the top fairing Steps are provided on each side of the plane to facilitate loading and unloading of passengers, step plates used on a well-known make of motor car being employed Entrance to the pilot's cockpit is from the right side only by means of a streamline step welded to the fuselage Windshields are of celluloid and completely protect the passengers and pilot from the slipstream The following instruments are installed in the pilot's cockpit Tachometer, engine switch, oil pressure gauge, water thermometer, altimeter and air speed indicator On the first machine, a second thermometer, indicating the temperature of the water after leaving the radiator was fitted to determine the efficiency of the radiator. The plane is fabric covered, and a color scheme of black and yellow has been carried out The fuselage, wing struts and landing gear are doped black, the wings and tail surfaces doped yellow, and the exposed fittings and wires painted blue The engine cowling and cockpit cowling are finished with black gear varnish, sprayed on The fabric surfaces are finished with two coats of clear dope, brushed on, and two coats of clear and one of pigmented dope, sprayed on

Wind Tunnel Tests and Performance

The design of the plane was checked and the performance predicted from wind tunnel tests carried out at M.I.T on a scale model 1/20 actual size These tests showed a minimum flying speed of 48 m.p.h., a maximum speed of 97 m.p.h., and a cruising speed, at ¾ full throttle, of 88 m.p.h

The Pitcairn Fleetwing [illegible] out of the factory



Front view of the Pitcairn Fleetwing (Curtiss C 6 160 hp)

at Bryn Athyn early in 1926. Notable for its rapid climb and slow landing speed, the plane proved its performance during flight tests conducted by Carl Schory, Executive Secretary, Contest Committee of the National Aeronautical Association, and C Towsend Ludington, Pennsylvania Governor of the National Aeronautical Association, who officially certified its performance figures after tests on April 17 and 19, 1926. The details follow:

(Certified by National Aeronautical Assn.)

Light with pilot, oil, water and 32 gals gasoline and without passengers

Maximum speed at ground	109.8 m p h
Ceiling	15,886 ft

Loaded, with pilot, oil, water, 32 gals gasoline and with 700 lbs of sand

(Total weight 2981 lb.)

Maximum speed at ground	106.2 m p h
Ceiling	12,145 ft

General Characteristics

The general features of the machine are as follows:

Span, upper wing	38 ft.
Span, lower wing	33 ft 1 in
Chord, both wings	62 in
Gap	6 ft at center
Stagger	25 in
Incidence, upper wings	1½ deg
Incidence, lower wing	½ deg
Dihedral, upper wing	0 deg
Dihedral, lower wing	2 deg.
Length overall	25 ft 11 in.
Height overall	9 ft. 10 in.
Weight, empty	1802 lb
Useful load	1110 lb
Passengers	610 lb.
Pilot	160 lb
Gasoline	210 lb
Oil	40 lb
Water	60 lb
Weight loaded	2912 lb
Area of wings	350.67 sq ft
Area of horizontal tail	39.63 sq ft
Area of vertical tail	15.32 sq ft.
Power	180 hp at 1750 r.p.m
Wing loading	8.3 lb./hp
Was Power loading	18.1 lb./hp.
Wing section	USA-27

The Chicago Aeronautical Service

A new company, called the Chicago Aeronautical Service, has been incorporated under the laws of the State of Illinois, with offices in the Transportation Building, Chicago, Ill.

The object for which the company has been formed is to maintain, conduct, operate, manufacture and deal in airplanes, do a general aerial advertising business, aerial photography, and to render passenger service, give flying instructions, and, in general, to give and render aeronautical service of every nature and description permitted by law.

The officers and directors are as follows: Jerome J Klapka, president and treasurer, Matt E Holpuch vice-president, Rudolph Smid, secretary, James Friedl director, Anton Hess, director, Edgar E LaParle, chief pilot, Chas E Lessong chief aeronautical engineer, and Ralph E Unangst sales manager.

The company has purchased a K-5 Eastman Aerial Camera and expects to commence operations immediately. This camera will be mounted on one of the company's five-place Standards, fitted with a 220 hp Hispano Suiza engine.

Mr. Klapka, the president, has been interested in aviation since 1910, at which time he became a charter member of the Aero Club of Illinois and has been in the advertising and commercial photography business for over twenty years. He is president of the Jerome J Klapka Co., Inc., artists, engravers and printers, for six years.

Mr Edgar E LaParle, the chief pilot for the company, has been a civilian flier for many years, having flown at many air meets. Prior to his connection with this company, Mr. LaParle was chief instructor for the Heath Airplane Company of Chicago, for several years. Previous to that time he owned and operated several Curtiss Seagull flying boats at the Edgewater Beach Hotel. He also did night flying at the Chicago Pageants of Progress held at the Municipal Pier in 1921 and 1922.

Mr. Unangst, the sales manager, has a wide reputation as an organizer and is capable of handling men, having been connected with some of the largest organization work in the United States.

Artificial Fog Dispersal Experiments

One of the greatest menaces to safe aerial navigation—fog, the bane of every airman—may be greatly lessened with the successful completion of experiments being conducted by the Naval Bureau of Aeronautics in the precipitation of fog over airplane landing fields.

Although the experiments, which have been in progress for several years, have not been completed, they have reached the point where confidence is expressed that fog-precipitation apparatus can be used in disposing of fog-banks over landing fields, thereby clearing paths in which planes may land in safety.

By means of a specially mounted airplane propeller, electrically charged air has been projected in such fashion as to constitute an electrically charged curtain of air which precipitates the fog and thus opens a clear path for landings. These experiments have been carried on at the Naval Aircraft Factory in Philadelphia and elsewhere.

Those concerned with the experiments estimate that 277,000,000 cu ft per minute of fog drifts at the rate of 2 m.p.h over a landing field through a vertical curtain of charged air having a radius of 1,000 ft. with the center on the ground.

One type of apparatus with which the Navy is experimenting is capable of passing through it 700,000 cu ft of air a minute, which it charges electrically and throws into charged curtains. It is estimated that these curtains can cause the precipitation of about 95 per cent of the fog moving over the landing field, thus clearing a section 1,000 ft. high and 2,000 ft. wide over the full length of the field.

This apparatus consists of a simple type of corona charging screen, a transformer with rectifying apparatus and an airplane propeller and engine all mounted on a truck. It has been determined that an airplane propeller driven by a 400 hp engine mounted on a swivel has sufficient power to project electrically charged air over a vertical plane having a radius of 1,000 ft., thus forming an electrically charged curtain through which all fog coming over the landing field must pass.

Important principles in fog precipitation have been determined by the Navy's tests on this subject. It has been found that fog must be electrically charged and that a projected electrostatic field, to drive the fog particles together, is essential for electrical precipitation over an open field.

Further experiments will be carried on to determine such points as the distance to which the electrostatic field can be projected, whether the charging corona should be set up by direct or alternating current and the proper voltage to use.

Other fog precipitation experiments are being carried on jointly by the Navy Bureau of Aeronautics and the Air Service on the principle of electrically charging dust or sand particles which are released into the fog from airplanes, thus causing condensation and ultimate dispersal of the fog. The successful completion of these important experiments will remove one of the greatest menaces to safe air navigation. The field for the use of fog precipitation apparatus is wide and no doubt ultimately will be used in great cities to lessen traffic congestion and dangers on foggy days, and also in harbors and channels where shipping becomes congested and delayed by reason of fog.

While these experiments have been carried on by the Navy purely upon an experimental laboratory basis with the object of improving the theories of the subject, the work is now being continued with a view to developing the principles involved in such a manner as to make it possible to utilize fog dispersal apparatus upon a practical basis.

Model Designation of Naval Airplanes

A Full Statement of the System Employed in Designating Naval Airplane Designs.

The particular system of letter designation of airplanes designed and produced for the Navy is of considerable interest and it is thought that an insight into the sequence governing the working of the system will be both enlightening and valuable.—EDITOR

Naval models of airplanes are divided into nine classes in accordance with the function to be performed. Each class is designated as follows:

Class	Designation
Fighting	VF
Transportation or general utility	VJ
Marine Expeditionary	VM
Training	VN
Observation	VO
Patrol	VP
Scouting	VS
Torpedo and bombing	VT
Experimental	VX

Class Designation

The letter "V" signifies a heavier-than-air craft as "Z" signifies a lighter-than-air craft. This letter is omitted in the designations of individual models of the various classes of airplanes, but must be employed in all official correspondence relative to classes of airplanes, naming of airplane squadrons, etc. When an airplane performs functions of more than one class, the primary function determines its class designation. Present practice is to designate airplanes by a group of letters and numbers. This consists first of a letter indicating the class, second, a number indicating the model and third, a letter indicating the manufacturer, followed by a dash and a number indicating the modification of the model.

The manufacturer's letters are:

A—Aeromarine P. & M. Co	N—Navy Department
B—Boeing Airplane Co	O—
C—Curtiss A. & M. Co	P—
D—Douglas Co	Q—
E—G Elias and Bro	R—
F—	S—
G—	T—
H—Huff Daland & Co	U—Chance Vought Corp.
I—	V—
J—	W—Wright Aero Corp
K—	X—Cox Klemin Aircraft Corp.
L—Loening Aero. Engineering Corp.	Y—Consolidated Aircraft Corp.
M—Glenn L. Martin Co	Z—

In the designation of the first model, the first number (1) is omitted. Thus the Boeing Company's first training plane is the NB-1. When a major alteration, not of a character to change the model, was made in the NB-1, the modified plane was the NB-2. A second modification of the first model would be the NB-3. A second training plane built by this company would be the N2B-1. Similarly the first modification of the N2B-1 would be the N2B-2, and the succeeding modifications would be the N2B-3, etc.

There follows a descriptive list of all naval airplanes on hand or under construction 1 January 1926. Asterisks indicate planes given model designations before the present system was put into effect and which do not conform to the above system.

The following abbreviations are used in the list of model designations given below:

TB—tractor biplane	(A)—air cooled engine
TM—tractor monoplane	(W)—water cooled engine
TT—tractor triplane	Conv't—convertible
PB—pusher biplane	Land—landplane
PM—pusher monoplane	Amphib—amphibian

Date—year first manufactured

Model	*Manufacturer*	*Features*	*Engines*	*Remarks*
CS-1* (VS)	Curtiss A. & M. Co., 1923	2-crew TB Conv't, 2 float	(W) Wright T 2	Similar to SC also (VT)
CS-2* (VS)	Curtiss A. & M. Co., 1924	2-crew TB Conv't 2 or 3 floats	(W) Wright T 3	Extra float—3rd can be dropped also (VT)
CS-3* (VS)	Remodeled NAF 1925	2 crew TB Conv't 2 float	(W) Wright T 3 geared	also (VT)
DH4B 1* (VO)	from Army, 1920	2 crew TB land	(W) Liberty	Enlarged tanks. Large wheels
DH4B 2* (VO)	Remodeled NAF 1923	2-crew TB land	(W) Liberty	Armament removed
DT 2* (VT)	Douglas Co NAF & LWF Dayton Wright 1922	2 crew TB Conv't 2 float	(W) Liberty	
DT 4* (VT)	NAF & Wright Aero Corp., 1922	2 crew TB Conv't 2-float	(W) Wright T 2	
DT-5* (VT)	NAF & Wright Aero Corp., 1924	2 crew TB Conv't, 2 float	(W) Wright T 2 geared	
DT 6* (VT)	Wright Aero Corp 1925	Same as DT 2	(A) Wright P-1	
EM 1* (VM)	G Elias & Co., 1921	2 crew TB Conv't, 1 float	(W) Hispano	
EM 2* (VM)	G Elias & Co., 1922	2 crew TB Conv't, 1 float	(W) Liberty	
FB-1	Boeing Co 1925	1 crew TB land	(W) Curtiss D-12	Similar to Army PW 9
FB 2	Boeing Co. 1925	1 crew TB land	(W) Curtiss D-12	Deck landing
FB-3	Boeing Co. 1926	1 crew TB Conv't, 2 float	(W) Packard 1A 1500	
FB-4	Boeing Co. 1925	1 crew TB Conv't, 2 float	(A) Wright P 2	
FB 5	Boeing Co 1926	1 crew TB Conv't 2 float	(W) Packard 2A 1500	Deck landing. Radio
F4C-1	Curtiss A. & M. Co 1924	1 crew TB land	(A) Wright J 1	Metal FS design. By Chas. Ward Hall.
F6C-1	Curtiss A. & M. Co 1925	1 crew TB Conv't, 2 float	(W) Curtiss D 12	Similar to Army PW 8A and P 1
F6C-2	Curtiss A. & M. Co. 1925	1 crew TB Conv't, 2 float	(W) Curtiss D-12	Deck landing
F6C-3	Curtiss A. & M. Co. 1926	1-crew TB Conv't 2 float	(W) Curtiss D-12	Deck landing. Radio
F5L* (VP)	Curtiss NAF and others 1918	4 crew TB Boat	(W) 2 Liberty	Also scout and bomber
H 16* (VP)	Curtiss NAF and others 1918	4-crew TB Boat	(W) 2 Liberty	
HN 2* (VN)	Huff Daland & Co., 1923	2 crew TB Conv't 2 float	(A) Wright J 1	Engine change. Tail enlarged
HO 1* (VO)	Huff Daland & Co. 1923	2 crew TB Conv't 2 float	(W) Wright E-2	
HS2L* (VP)	Curtiss LWF and others, 1918	2 crew PB Boat	(W) Liberty	HS1L with extra wing panel
JN4H* (VN)	from Army Built 1918	2 crew TB land	(W) Hispano A or I	Lower wing ailerons only
JN6H* (VN)	from Army Built 1919	2 crew TB land	(W) Hispano A or I	Upper and lower wing ailerons
Longren* (VX)	Longren Aircraft Corp 1924	2 crew TB land	(A) Lawrance L-4	Pressed fiber fuselage
MBT* (VT)	Glenn L Martin Co 1920	3 crew TB land	(W) 2 Liberty	Similar Martin bomber. Changed landing gear
MO 1* (VO)	Glenn L Martin Co 1923	3 crew TM Conv't 2 float	(W) Curtiss D 12	
M2O-1* (VO)	Glenn L Martin Co 1922	3-crew TB Conv't 2 float	(W) Curtiss D 12	Similar to MO-1
MS-1* (VS)	Glenn L. Martin Co 1923	1 crew TB 2 float	(A) Lawrance L 4	Metal structure design similar to XS 1
NB 1	Boeing Co 1925	2 crew TB Conv't 2 float	(A) Wright J-4	Also gunnery
NB-2	Boeing Co 1925	2 crew TB Conv't 2 float	(W) Wright E 4	Also gunnery
NB-3	Boeing Co., 1925	2-crew TB Conv't 2 float	(A) Wright J 4	Tail 2 ft aft. Engine 10 in. forward.
NB-4	Boeing Co 1925	2 crew TB Conv't 2 float	(A) Wright J-4	Tail 3 ft aft. Engine 26 in. forward.
N9 (VN)	Burgess Curtiss and others 1917	2 crew TB Conv't, 1 float	(W) Hispano A or I	Primary seaplane training
NM 1* (VM)	NAF 1925	2 crew TB Conv't 2 float	(W) Packard 1A 1237	All metal
N2M 1	Glenn L Martin Co 1924	2 crew TB Conv't, 1 float	(A) Wright J 1	
N2N 1	NAF 1923	2 crew TB 2-float	(A) Wright J 1	
NO-1* (VO)	NAF & LWF, 1924	3 crew TB Conv't, 2-float	(W) Curtiss D-12	Similar to M2O 1
NO 2* (VO)	NAF 1924	3 crew TB Conv't 2 float	(W) Packard 1A 1500	
NY 1	Consolidated Aircraft Corp., 1926	2 crew TB Conv't, 1 float	(A) Wright J-4A	Gunnery and Flight Training
O2B 1	Boeing Co 1924	2 crew TB land	(W) Liberty	Army DH4 BM metal fuselage
O2B-2	NAF remodeled 1925	2-crew TB land	(W) Liberty	Increased radius
OL-1	Loening Aero Eng Corp., 1925	3 crew TB Amphib-boat	(W) Invert. Packard 1A 1500	
OL-2	Loening Aero Eng Corp. 1925	2 crew TB Amphib-boat	(W) Invert Liberty	Similar to COA1 Arctic flight
OL-3	Loening Aero Eng Corp., 1926	3-crew TB Amphib-boat	(W) Invert. Packard 1A 1500	Similar to OL-1 Photographic
OL 4	Loening Aero Eng Corp., 1926	3-crew TB Amphib-boat	(W) Invert Liberty	Similar to OL-1 Photographic

Model	Manufacturer	Features	Engines	Remarks
PB 1	Boeing Co 1925	5-crew PB TB boat	(W) 2-Packard 1A 2500	Tandem engines
PN 7	NAF, 1923	4-crew TB Boat	(W) 2-Wright T 3	Development from F5L
PN 8	NAF, 1924	4-crew TB Boat	(W) 2 Wright T 3	Metal Hull Development from PN-7
PN 9	NAF 1925	5-crew TB Boat	(W) geared 2 Packard	All metal Extra tanks—special
PN-10	NAF, 1926	5-crew TB Boat	(W) 2-Packard 2A 1500	Service PN 9
R2C 2* (VX)	Curtiss A & M Co, 1923	1 crew TB 2 float	(W) Curtiss D 12A	1924 racer Remodeled R2C 1
R3C 1* (VX)	Curtiss A. & M Co, 1925	1-crew TB Conv't, 2 float	(W) Curtiss V 1400	1925 racer
R6L* (VT)	Curtiss A & M Co 1919	2-crew TB 2 float	(W) Liberty	
SC 1	Glenn L Martin Co, 1925	3-crew TB 2 float	(W) Wright T 2 or 3	Similar to CS-1 also VS-VT
SC-2	Glenn L Martin Co, 1925	3-crew TB 2 float	(W) Wright T 2 or 3	Deck and shipboard. Larger floats also VS-VT
SC 6	Glenn L Martin Co, 1925	3 crew TB 2 float	(W) Packard 1A 2500	Increased power also VS-VT
SC 7	Wright Aero Corp 1926	3 crew TB 2 float	(W) geared Wright T-3	Supercharged also VS-VT
SDW 1* (VB)	Wright Aero Corp, 1924	3 crew TB 2 float	(W) Wright T 3	Similar DT 4 extra fuel capacity
T3 1	Boeing Co, 1926	3 crew TB Conv't 2 float	(W) Packard 1A 2500	Deck and shipboard also VS VT
T2D-1	Douglas Co, 1926	3 crew TB Conv't, 2 float	(A) 2-Wright P 2	Deck and shipboard also VS-VT Similar to TN 1
TG 3* (VN)	NAF 1924	2-crew TB 1 float	Aeromarine T 6	Training and gunnery
TG 4* (VN)	NAF 1924	2 crew TB 1 float	Aeromarine T 6	Fuel tank in float
TG 5* (VN)	NAF 1924	2-crew TB 1 float	(W) Wright F	
T3M 1	Glenn L Martin & Co, 1926	3-crew TB Conv't 2-float	(W) Wright T3B	Shipboard Development from SC 2 also VS-VT
TN 1	NAF 1926	3-crew TB Conv't 2-float	(A) 2 Wright P 2	Deck and Shipboard Similar to T2D 1 also VS-VT
TS 1* (VF)	Curtiss A & M. Co, NAF, 1922	1 crew TB Conv't 2 float	(A) Wright J 1	
TS-3* (VF)	NAF 1923	1-crew TB Conv't, 2 float	(W) Wright E 2	
TW 3* (VN)	Dayton Wright 1922	2-crew TB Conv't, 1 float	(W) Wright E-2	
UO-1* (VO)	Chance Vought Corp, 1922	2 crew TB Conv't, 1 float	(A) Wright J 1, 2 or 3	Shipboard fixed gun
UO-2* (VO)	NAF remodeled, 1925	2 crew TB Conv't 1 float	(W) Wright E 3 or 4	
UO 3* (VO)	Chance Vought Corp 1926	1 crew TB Conv't 1 float	(W) Wright J 4 or 5	Training fighter Conv't to UO-1
VE 7* (VN)	Chance Vought Corp. 1920	2 crew TB land	(W) Wright E 2	
VE 7H* (VN)	Chance Vought Corp. 1921	2 crew TB, 1 float	(W) Wright E 2	
VE7SF* (VF)	Chance Vought Corp., 1921	1 crew TB land	(W) Wright E 2	Flotation gear
VE 9* (VO)	Chance Vought Corp. 1922	2-crew TB Conv't, 1 float	(W) Wright E 3 or 4	Similar to VE-7 Hinged top cowling between seats
WP-1* (VF)	Wright Aero Corp 1926	2 crew TM Land	(W) Wright H 3	Wright 'Falcon' All metal Similar to Dornier 'Falke'
XB1* (VB)	Cox Klemin Aircraft Corp. 1923	1-crew TB, 2-float	(W) Lawrance L-4	Similar to MS Wood structure
XS-2* (VS)	NAF 1926	1 crew TB 2 float	(A) Kinney 9RA	Rapid assembly

Further Italian Air Transport Operations

The Italian "Aero Espresso" line has secured from Turkey a grant of half of the Buyukdereh plain on the European shore of the Bosphorus for its eastern terminus, and will offer a passenger and freight service from Constantinople to Piraeus, the seaport of Athens, Greece, and to Brindisi, an Italian port on the Adriatic Sea.

Hangars and buildings to house the customs, police and sanitary headquarters are in the process of construction. It is understood in Constantinople that, according to the terms of the agreement under which the company acquired its concession, these installations may be taken over by the Government after a period of ten years' exploitation by the Aero Espresso. Service will be started on May 1, according to the company's announcement.

At the same time that these preparations are under way, a group of Turkish deputies is reported to have proceeded to Germany for the purpose of getting in touch with a German aviation company which has hinted that it would be pleased to open a service between Constantinople and other European cities. One feature which is said to have been promised in connection with the establishment of this line is the inauguration of a Constantinople air postal service.

The new Japanese airship, Kasumigaura, at the Naval Air Station near Tokyo just before taking off on its first test flight. As will be seen the airship is of the non-rigid type with twin pusher engines. Whether the numeral designation on the lower vertical tail fin indicates that three previous airships of similar type have already been built, is a matter of some conjecture.

AIRPORTS AND AIRWAYS

Monmouth, Ill.

By Ralph B Eckley

The Midwest Airways Corp received two more Wacos during the first week of May from the Advance Aircraft Co of Troy, Ohio, making a total of nine machines delivered to the local concern since the first of the year

La Pierre Cavender, of Chicago, recently purchased a Waco and is handling the planes in Cook county for the Midwest Another machine was delivered late in April to the Sterling Airscape company, of Sterling, Ill Howard Coghill, of Roseville, who received his training at the Monmouth field several years ago, has been employed to fly the plane

Word has been received that R M Hinckle, of Wallburg, N C, who learned to fly here and also purchased a Laird airplane from the Midwest, had arrived safely on the East coast, where he expects to establish a flying service this Summer

Many inquiries have been received recently about student training and it is expected that the business will be heavier than usual this year Among the recent arrivals is E C Lach, of Beardstown, Ill., a railroad conductor, who began his course on May 1

Hartford, Conn.

By Harry Depew Copland

Brainard Field has just emerged from its annual bath, administered by the Connecticut River, when she overflowed her banks, and swept across the airport for several days The surface is level and hard, and ready for the great aerial activity which the coming season promises

The Boston New York air mail will start July 1, making a fifteen minute stop at Hartford, during each trip Much public interest is being evidenced in this new line, to be opened by the Colonial Air Transport Inc

The 118th Squadron, Conn National Guard, is moving into its splendid new quarters, consisting of four new brick buildings and two hangars, flying has been temporarily suspended, thus depriving the members of the Guard, including the writer, of their weekly "conditioner"

The City's civilian hangar has been moved to its new location and inside there is much activity among the pilots grooming their mounts for the season's grind

Johnny Ladig has been doing some very pretty flying with his Swallow, and has a number of students under instruction "Pere" Spencer and Barrows are doing considerable Waco flying During the flood Spencer, while flying from a field in Bloomfield, landed in soft ground which resulted in a ground loop, with the usual damage to nose of both plane and pilot Carl Dixon, Charley Wright, and Roscoe Brinton, with the writer, expect to have their planes on the line, in the near future Several new comers are expected on the field

The writer rejoices in hearing from Earl Ovington, for, in 1911, when he was a hero with his Bleriot Dragonfly, yours truly was taking his first hops in a pusher

Salt Lake-Los Angeles Air Mail

Completion of the first week's operation of the Salt Lake-Los Angeles air mail route was made in a "very creditable fashion," the Post Office Department announced, upon receipt of information from W E La Follette, superintendent of the western division of the Air Mail Service with headquarters at Salt Lake City

Schedules both ways have been on time or ahead of time, except on April 18, when Pilot Jimmie James was forced to land in California on account of weather The average mail load per flight for the eight days has been 128 lb. Service on this route was inaugurated April 17, 1926

Mr La Follette also advised that mail has arrived in San Francisco ahead of schedule every day except April 23, when "it just got as far as Salt Lake"

Continuing, he said

"Friday's mail left Salt Lake at 3 07 a m., Saturday, and reached Frisco at 9 40 a.m, which is the first late arrival at San Francisco since the New York section of April 8 With the contract air mail routes in operation, it requires from 30 to 50 min to work the mail here and the early westbound arrivals at Salt Lake have prevented many late departures from Salt Lake"

Long Island News

From the amount of Long Island News which has appeared in these columns those on the Pacific Coast have probably decided that the Pulitzer races were the last aeronautical activity which had occurred on that part Quite the contrary is true for the Island is still probably the most active center of aviation in the United States

The Curtiss Flying Service, of Garden City, have soloed over twenty students so far this year. Considering the exceptionally cold weather which has prevailed, this is a very good record About twenty five students are now enrolled in the instruction classes One of the students is exceptionally large and the instructor claims that he weighs 310 lb This has caused much argument so the student and a set of scales were produced and it has been proved that he weighs in at 225 lb Another student, J R Coe, of New York and Ottawa, is over sixty years old He expects later to learn to fly a boat and fly into his camp in the wilds of Canada

Art Caperton made a flight this Winter to Lake Placid in an Oriole equipped with skis. The trip up was uneventful but the weather was extremely cold and when the engine was started for the return trip something went wrong and a new engine had to be shipped up When the new engine had

Staff Photo

Flying activities at Curtiss Field, L I Curtiss Lark in foreground The Standard is delivering a metal prop by the air route

been installed, Caperton started back to Garden City rather late one afternoon He arrived at about dusk and, much to his chagrin, discovered that the weather had turned warm and that there was no snow left on the ground,—only a sea of mud. Landing with skis on the bare ground was a new experience but it was too late to fly North to the snow lands and Caperton made a very pretty landing and, except for an unusually short run before stopping, nothing unusual happen-

ed Since then, Caperton has made a flight out to Cincinnati with Roi Tolleson, editor of the *Daily Running Horse*. The flight out took 7 hr, while the return trip was made in 7½ hr

The Curtiss flying field is getting rather too valuable and, in the course of the next couple of years, the Flying Service is preparing to move out According to present indications, the members of the organization expect to go into aerial agriculture No official announcement has been made on the subject but a considerable amount of experimenting is going

Staff Photo
The wandering Sikorsky visits its birth place in Long Island

on in a lush lush manner A recent visitor discovered a Jenny with grass growing out of the tail surfaces Officials explained that the Jenny had flown 450 hr. since July and dirt had collected while waiting for overhaul and that the grass had just naturally started to grow,—but there are those who know better. More recently, Dick Depew, while flying near Croton, saw in the air a flying boat with wheels on and a large tree growing out of the front cockpit Depew immediately returned to the Curtiss field to report the strange phenomenon but the officials stated that it was only Art Caperton in the amphibian flying a tree from the Amawalk Nursery to be planted in Riverside Park by Mayor Walker and Rene Fonck. It is quite evident, however, that the Curtiss Flying Service, with its usual resourceful progressiveness, is preparing to go into the new art of aerial agriculture

After the test of the Fokker planes for the Byrd expedition the Atlantic Aircraft moved into its new hangar which is located at Hasbrouck Heights, N J

Ireland, having sold practically all his Comets, has now built a new type of hop ship Performance tests are now being run and an official description will soon be issued

The Fairchild Caminez engine has been undergoing a series of flight tests out at Farmingdale The engine is fitted in an Avro and seems to run very smoothly The Fairchild interest has acquired the old Sperry plant and installed a considerable amount of machinery for the manufacture of the engines There is little more work to do on the Fairchild camera plane but no definite data has been given out as to when the machine will be flown The Fairchild company is having the Aeromarine metal boat overhauled at Key Port, N J, by the Aeromarine Plane and Motor Co

The Sikorsky three engine plane which Fonck expects to fly to Paris seems to be at least seventy-five per cent complete It is certainly one of the most interesting looking and practical planes which has ever been seen in this country

The Curtiss Aeroplane and Motor Co is busy with orders for pursuit planes and is building an ever increasing amount of metal propellers

The Kirkham shops are turning out a lot of replacement parts for Liberty engines besides rebuilding rotary engines into radials They also are building, for a private party, a metal monoplane with variable camber wings and folding wing tips, which incorporates some new aerodynamic ideas and some extremely clever mechanism

Chicago, Ill.
By Otto Klem

The Chicago Aero Commission officially opened the city's new municipal airport at 63rd Street and Cicero Avenue on Saturday afternoon, May 8 On this occasion the National Air Transport airplane, destined to make the initial trip with mail and express from Chicago to Dallas was christened with the good name "Chicago" The ceremonies were attended by officials of the City of Chicago and the Association of Commerce, as well as many local fliers.

The Chicago Aeronautical Service has added a new LS-5 to their equipment, which now consists of three planes. The company is engaged in aerial advertising work and has lined up a number of good contracts for the Summer

Walter W Meyer is having his Liberty Six Standard rebuilt into a five place job by the Heath Airplane Company

Donald Cowan and Cecil Schultz, former students of the Heath Airplane Company, have departed for Cowan's home at Andes, N. Y They took off with a stiff tail wind that sent their OX-5 Standard eastward at a good clip

It has been stated in local papers that during the Elk's Convention here next month a balloon race may be staged in Lincoln Park, the park board having given permission to use the North end that was at one time almost made into a flying field A balloon race in the city's front yard is something quite out of the ordinary and should create great interest.

Moline, Ill.
By W B Mueller

John Cahle, student and employee at Moline airport for the last two years, is helping George Stienke to establish a flying field at Plainview, Mich Cahle left Moline with the intention of returning in June and starting operations on his own account with a plane purchased from the Campbell-DeSchepper Airplane company He will operate from the local field Mr. DeSchepper taught him to fly

Preparations were completed some weeks ago in Moline for Moline's part in the new air mail line on the Chicago-Dallas route. Local business men have started an educational campaign to induce tri-city folk to use the air mail service. Rock Island, Ill, and Davenport, Ia, neighbor cities, are within easy reach of the service, which is meant for them also, and are cooperating splendidly with Moliners in boosting the air mail project Kiwanis and Rotary club members, newspaper men and business men—in fact, all the Modocks, are doing all they can, hereabouts, to help aviation and indications are that aviation will be benefitted locally by their efforts

Memphis, Mo.
By Lee R Briggs

Activities around here have been going on despite the snow, mud and high winds. Mail was carried to the rural districts, by the writer, which had not been delivered for several days on account of the deep snow and high drifts. A doctor was taken to see a patient via plane when all other modes of transportation were impossible

This city is to have a municipal landing field, which is a 50 acre tract, one-half mile North and one mile East of the center of town The area is level and no obstructions exist except telephone wires on the North Parking space and a hangar are in the Northwest corner. The field will be marked with a circle in the center and a wind cone on or near the hangar will be provided Plans are being made to formally open this field on May 24 and 25 Several planes have already been promised for the occasion The event is put on by the Chamber of Commerce, Memphis, Mo.

By consulting your map, you will see that this field will be on a direct line between Des Moines, Iowa and St. Louis, Mo Also the air line between Omaha, Neb, and Springfield, Ill, passes here And, again, it is near the route of the air mail between St Joseph, Mo, and Moline Ill Then, too, the air line between Kansas City, Mo, and Chicago is very

close to this field,—so close that it would be well for all pilots to come this way. Gasoline, oil and telephone facilities will be on the field. Visiting pilots will always be welcome and shown the best of service

Boston, Mass.
By Perter Adams

The Aeronautical Engineering Society of the Massachusetts Institute of Technology held its annual dinner on Wednesday, May 12, at North Hall of the Walker Memorial Building. The officers of the Society are —

F. T. Kurt, president, P. A. Gillies, vice-president; Harry Kaufmun, secretary and treasurer Directors B. S Kelsey, E M Lester, R E. Manchester, G E Francis, Jr, R. E. Hunter

Announcement has been made that, in addition to operations at the Boston Airport, the Boston Airport Corporation will use the field between the Boston-Salem turnpike to Revere Beach Boulevard for passenger carrying work during the Summer.

Col Edgar S. Gorrell, former Chief of Staff, Air Service, in France, and now vice-president of the Stutz Motor Car Company, Indianapolis, was in Boston a short while ago on business

Announcement has been made that Capt. Conrad H. Biddlecombe, formerly Deputy Director of Civil Aviation in the British Air Ministry, has become associated with Colonial Air Transport Captain Biddlecombe was in Boston last week, having flown up from Mitchel Field via Hartford with Lt J. K McDuffy, to look over the route

Dan Rochford, famous aviation editor of the *Boston Transcript*, has become so enthusiastic over aviation that the first day of Spring inspired him to write a touching poem entitled "the Passing of Jenny". This appeared first in the *Transcript* of April 26

On Saturday, May 1, the Macauley Trophy, which is awarded annually to the Boston pilot who flew the greatest number of hours during the preceding year without serious injury to property or personnel, was presented at the Parkman Band Stand on Boston Common This Trophy was won last year by Lieut. R. D Thomas, Commanding Officer of the Naval Air Station, Squantum, and the committee of award includes Prof E P Warner, of the Massachusetts Institute of Technology and Lieut Daniel Rochford, the distinguished poet mentioned in the preceding paragraph

The Macauley Trophy, which is awarded annually by the Army and Navy Service Committee to the pilot operating from Boston and vicinity flying the most number of hours during the preceding year without serious injury to personnel or property was again awarded to Lieut. R D Thomas, Commanding Officer of the Naval Air Station, Squantum, Mass. Thomas had a total flying time for the year of 731 hr

Anthony Fokker definitely accepted the invitation of the Aeronautical Engineering Society of the Massachusetts Institute of Technology to be a guest at its annual banquet on May 12

Boston has in contemplation an aviation meet to be held sometime in September at the Boston Airport under the auspices of the Reserve Officers of Boston and vicinity Details are at present being worked out by a committee and the exact date with full particulars should be available in the near future

There is also a prospect that an aviation meet will be held again this year at Brockton on Friday, Oct 8, in connection with the Brockton Fair It is proposed to award a trophy to be known as the Charles M Hickey Trophy, in memory of Lieut Charles M Hickey, a newspaper man of Brockton, who was killed last Summer at Mitchel Field

Much interest is being shown in Boston-New York Air Mail service which is to be operated by Colonial Air Transport and the committee investigating the use of the air mail reports a very encouraging attitude on the part of Boston business men The district manager of a large corporation reported that he had been using the air mail considerably and found it very satisfactory and that he felt the service would be used very extensively by his own corporation as well as many others as soon as the hook-up of the transcontinental air mail in New York was completed

Fort Wayne, Ind.
By Paul Holbrech

The Sweebrock Aviation Company has taken a five year lease on an 80 acre flying field, three miles North of the city It will be known as the Sweebrock Airport. The company has been operating for some time and plans to enter all branches of aviation, including photography, passenger carrying, inter-city tours, instruction, airplane hauling and rebuilding The company has one hangar completed and two under construction It also has a separate office and confectionery The field is well marked and service will be the watchword All parts are available at all times Gasoline and oil will be dispensed from a double pump filling station.

Besides the company's planes, the Goral Airways, Inc., Roger Mensing, Artie Dudgeon and Jack Trumble will operate from the airport

The company extends a cordial invitation to all fliers to make use of its field Bus service and interurban and a paved road make transportation to the center of the town a matter of ten minutes

Army Air Orders

First Lieut Ennis C Whitehead, A.S, McCook Field, to Fairfield

First Lieut Phillips Melville, A.S., McCook Field, to Langley Field

Capt Junius H Houghton, A S, Dayton, to San Diego

Sec Lieut Howard G Davidson, A S, Scott Field, relieved of present assignment and duty and will report to Com A S Bal & Airship Sch, that field, for duty as a student

Capt Raymond E O'Neill, A S, Brooks Field, to Kelly Field

The resignation by Capt Lorenzo Lamont Snow, A.S., of his commission, accepted

First Lieut Richard T Aldworth, A S, Langley Field, relieved of duties and will report to com off. for assignment

The resignation by Maj Leonard H Drennan, A S, of his commission as an officer, accepted

Transfer of Sec Lieut Mitchel Alonzo Giddens, A S, to Cavalry announced Lieut Giddens is relieved from duty with sec div, Fort Sam Houston, and will report to com off, Fort Sheridan for duty with 14th Cav

First Lieut William R Sweeley, A S, Crissy Field, to Kelly Field

Capt Oliver W Broberg, A S, Chanute Field, to McCook Field

The transfer of Sec Lieut Ernest Avner Suttles, A S, to Inf., announced Lieut Suttles is relieved from present duties with sec div, is assigned to that div, at Fort Sam Houston, and will report to com off for assignment to Inf.

Navy Air Orders

Lieut Sam L La Hache det Nav Air Sta., Pensacola, to Bu of Eng

Ensign Neil K Dietrich det Nav Air Sta., Pensacola to temp duty U S S Chewink

Gunner Julian H Detyens det Rec Ship, Puget Sound, to Nav Air Sta, San Diego

Lieut Comdr Harold T Bartlett det Nav War Col, Newport, to Army Air Serv Sch, Langley Field

Lieut John B Lyon det Nav Air Sta, Pearl Harbor, to U S S Army Air Serv Sch of Eng, McCook Field

Ens William L Hoffh ins det Nav Air Sta, Pensacola, to U S S Wood

Lieut Comdr Everitt H Patton (DC) det U S S Altair, to Nav Air Sta, San Diego

Marine Corps Air Orders

Sec Lieut C J. Chappel det N A S, Pensacola, to M B, N.O.B., Hampton Roads.

Sec Lieut C. L Marshall det N A.S., Pensacola, to M B, Quantico

Sec Lieut P A Shiedler det N A S, Pensacola, to M B, N.O.B., Key West

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as shown by an independent and thorough canvass of the field.

One of the largest and most important advertising agencies in the United States recently decided, in the interest of one of its clients, to obtain independently from aircraft operators and pilots an expression of their preference for the different American aircraft publications

The aircraft operators and pilots were selected for this test with full understanding that the men who direct commercial air operations and the men who fly the planes comprise the commercial market for aviation products

A list was obtained containing the names of 1687 operators and pilots This list was compiled from records of the Aeronautical Chamber of Commerce, the Army Air Service, Aviation magazine and two of the largest dealers in aeronautical supplies

During the month of April 1925 the advertising agency sent a questionnaire to 1613 names on this list A summary of the replies shows that

AVIATION is in a class by itself:

Replies received	652
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FOR SALE: New OX5 Standard, $1,250 00, OX5 motors (Hammondsport), new in original crates, with tools complete, $375 00 Palmer & Fix, Torrance, Calif

WANTED Pilot with 3-place job, can arrange permanent location at our field Promising prospects for immediate business Westchester Aerial Dispatch, Inc, White Plains, N. Y

Steel tubing landing gear for STANDARDS, regular or D-H, make the old crate up-to-date, also 43 gal center section tanks, no change in rigging, put on in 30 min, $50 00 1 new Le Rhone $100 00, 1 Gnome with prop, $50 00 Geo L Bennett, 223 West 12th Street, Kansas City, Mo.

FOR SALE Model "A", Hisso Standard, condition A-1, 150 hp, linen year old Butler Aviation Co, Butler, Penna.

WANTED—CRACKUP Standard fuselage or complete, with or without motor Interested in fittings only, also aeromarine motors. Fred G Snow, Ludington, Mich

WANTED A few 45 hp or 50-60 hp Anzani engines, new or perfect condition and complete Box 448, AVIATION

WANTED: To trade, racing car, Rago motor. Motor is new in original crate. Motor turns 5100 r.p.m. Car cost approximately $2,000 For good ship, preferably Janny or Canuck, with OXX6 motor. Write Clarence Eggenberger, Pontiac, Illinois.

FOR SALE A limited number of first Flight Pasco-Elko Air Mail round trip souvenir blank envelopes; were lost with pilot Ross for three days. R A Klinge, No 301 Columbia St., Pasco, Washington.

WANTED Curtiss Standard, without motor, good condition Fred Wehrhan, 17 Bergland Ave, Union City, N. J

FOR SALE TM Scout, less motor and radiator, $250.00, F O B Houston Never crashed Fuselage excellent, wings need new linen R W Mackie, 1205 Willard Ave., Houston, Texas.

WANTED: At once to travel with GATES FLYING CIRCUS Pilots with long and varied experience, who understand motors and can keep ships in repair. Motor Mechanics, first-class, experienced Hispano men to fit bearings, general overhauls and shoot trouble, Riggers, who are good woodworkers and can recover Answer in detail giving full experience and salary expected by mail only Room 735, 17 Battery Place, New York, N Y

Hisso A Standard, perfect condition, nose radiator, DH wheels, fifty gallon tank, $1,800 Extra motor $400 Extra new wings $400 F J Ambrose, Arnold, Pa.

FOR SALE Hisso-Standard Excellent condition DH landing gear, extra large gas tanks, dual control, Hamilton prop Complete set tools and spares Ready to fly away $1,500 00 Will demonstrate Write C V Schlact, Saugatuck, Connecticut

Parachutes, new and used, rope ladders for stunt men, balloons for aeronauts Specify weight of riders Established in 1903 Thompson Bros Balloon Co, Aurora, Illinois

FOR SALE at a sacrifice special 3-place Laird OX5 motor; will deliver any place D F Shinn, Elgin, Kansas

FOR SALE: Standard J-1, Curtiss OXX6 motor, guaranteed, A 1 condition Will accept small car, preferably Ford T C Bush, Sedalia, Mo

Have Sopwith with new 130 hp. Clerget motor, extra motor for spares, uppers just recovered, also cracked JN4D Want cash, car, piano, high power microscope or what have you? Box 453, AVIATION

BARGAIN Special built five passenger airplane, front seat enclosed, steel struts, 50 gal center section tank, steel ladder both sides for passengers. Fuselage new Wings and fabric excellent condition Seven coats varnish and wax finish Extra wheel and tire Counter balanced LS5 type rudder 180 hp Hisso engine turns 1600 r.p.m. Ring True Wright bearings and rods Hamilton prop Built last fall and a beautiful job $2 300 for quick sale Wire deposit Ready to fly on week's notice Box 454, AVIATION

PILOT wants position flying for private party (no barnstorming) Have over 1,000 hours flying time Do all my own work on ship Excellent references as to character and ability C. E. Williams, Treynor, Iowa

FOR SALE: One 180 Hisso Oriole, A-1 fly-away condition Address communications to the Nutmeg Flying Corp, Post Office Box 46, Waterbury, Conn, or Field Office, Municipal Flying Field, Hartford, Conn

WANTED Quantity of new OX5 thrust bearings Must be marked Hess-Bright or US 214 and be cheap for cash Box 455, AVIATION

OX5 PROPELLERS, $5.75—LONGERONS, ASH, (1¼" x 1¼" x 14') only $3; scalloped tape, 4c yd, leather helmets, $3, goggles, $2 50 Wanted: used OX5s, Standard J1 parts OSTERGAARD AIRCRAFT, 4267 North Naragansett, Chicago

WANTED to buy Standard in good condition, OXX motor preferred R D Troutman, Box 67, Ethel, Mo

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